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Working Paper

Ideologically-charged terminology: austerity, fiscal consolidation, and sustainable governance

CESifo Working Paper, No. 7613

Provided in Cooperation with:
Ifo Institute – Leibniz Institute for Economic Research at the University of Munich

Suggested Citation: Gründler, Klaus; Potrafke, Niklas (2019) : Ideologically-charged terminology: austerity, fiscal consolidation, and sustainable governance, CESifo Working Paper, No. 7613, Center for Economic Studies and ifo Institute (CESifo), Munich

This Version is available at:
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CESifo WORKING PAPERS

7613
2019

April 2019

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CESifo

Impressum:

CESifo Working Papers
ISSN 2364-1428 (electronic version)
Publisher and distributor: Munich Society for the Promotion of Economic Research - CESifo GmbH
The international platform of Ludwigs-Maximilians University's Center for Economic Studies and the ifo Institute
Poschingerstr. 5, 81679 Munich, Germany
Telephone +49 (0)89 2180-2740, Telefax +49 (0)89 2180-17845, email office@cesifo.de
Editor: Clemens Fuest
www.cesifo-group.org/wp

An electronic version of the paper may be downloaded
· from the SSRN website: www.SSRN.com
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CESifo *Working Paper No. 7613*
Category 6: Fiscal Policy, Macroeconomics and Growth

Ideologically-charged terminology: austerity, fiscal consolidation, and sustainable governance

Abstract

Scholars have been active in investigating causes and consequences of austerity policies. We examine how economists use the term "austerity" in scientific studies and measure austerity in empirical analyses. The sample includes around 3,500 journal articles published in the top 400 journals (RePEc ranking) over the period 1990-2018. The results show that the term austerity is often used in heterodox journals. Papers published in mainstream journals use the term "fiscal consolidation" instead. The term austerity is ambiguous: scholars use manifold definitions of austerity and the empirical measures identify different country-year observations as periods of austerity. We employ panel data for 34 OECD countries over the period 1960-2014 and examine how austerity is associated with economic growth. The results show that depending on how austerity is measured, inferences change. Strategic selection of austerity measures allows scholars to arrive at any desired results about the economic effects of austerity periods.

JEL-Codes: P160, O110, O230, E620.

Keywords: austerity, fiscal consolidation, economic growth, rankings.

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April 2019
We would like to thank Clemens Fuest, Panu Poutvaara, Helmut Rainer, Günther Schulze, Heinrich Ursprung, Ludger Woessmann and Klaus Wohlrabe for useful comments, Anna Dudel and Julian Milek for their excellent research assistance and the Konrad-Adenauer-Foundation for funding.

1. Introduction

Public debt and budget deficits have dramatically increased in Europe during the financial crisis that began in 2007 (e.g. Lane, 2012). The criteria of the Maastricht Treaty (the debt-to-GDP ratio and the deficit-to-GDP ratio should not exceed 60 and 3 percent) were not fulfilled in many European countries. Consequently, national governments needed to consolidate their budgets and made attempts to decrease public debt and budget deficits. The attempts to consolidate public budgets have often been described as times of "austerity". The term austerity has been frequently used since the outbreak of the financial crisis in 2007. Politicians, journalists, and scientists alike have been active in using it. Empirical evidence on the effects of austerity policies on economic growth is, however, mixed. We elaborate on why previous studies arrived at mixed evidence by examining how scholars use the term austerity in scientific studies and measure austerity in empirical analyses.

Figure 1 shows how often the term austerity was used in journal articles and working papers since 1990. We focus on the use of the term austerity in the title, abstract, and keywords of an individual study. The data is based on 3,122 journals and 4,983 working paper series and covers the period January 1990 through November 2018. Since January 1990, the term austerity was used in 382 journal articles and 251 working papers (in the title, abstract or keywords). Scholars hardly used the term austerity until the year 2009 and began using it frequently by 2010.[2] In 2014, for example, 69 published papers used the term austerity in the title, abstract or keywords.

An interesting question is in which journals the term austerity was used frequently. We examine this issue in Section 2. The results show that the term austerity is often used in heterodox journals such as the Cambridge Journal of Regions, Cambridge Journal of Economics, and the Journal of Post Keynesian Economics. Papers published in TOP5 journals

[2] In a similar vein, using the term "fiscal sustainability" became *en vogue* as well (on fiscal sustainability see, for example, Bohn, 1998, and Potrafke and Reischmann, 2015).

did not employ the term austerity in the title, abstract or keywords. In mainstream journals, by contrast, the term "fiscal consolidation" was used instead of austerity. Scholars disagree, however, on what austerity means and have employed many definitions (Section 3). The first generation of studies on austerity use "simple measures" that examine the development of individual fiscal time series, including tax increases, spending cuts, and debt-to-GDP ratios. These measures are still used in empirical studies. A disadvantage of these measures is, however, that they react sensitively to cyclical fluctuations in economic activity. Changes in these measures therefore hardly reflect policymakers' intentions to reduce fiscal deficits. The second generation of austerity measures deals with this issue and attempts to disentangle cyclical effects and policymakers' intentions to consolidate budgets. Two approaches have become popular: the Cyclically Adjusted Primary Balance (CAPB) and the Narrative Approach (NA). Both approaches have, however, their own conceptual problems (Section 3) and are not exogenous to economic activity (Section 4 and Jordà and Taylor, 2016).

Descriptive statistics show that classifications based on simple measures, CAPB, and NA strongly disagree about the country-year observations that need to be classified as periods of austerity. What is more, periods of austerity often overlap with periods in which the criteria of the Maastricht Treaty were not fulfilled.

The inconclusiveness about how to measure austerity has drastic consequences for studies that investigate the economic effects of austerity. We use panel data for 34 OECD countries over the period 1960-2014 and show that empirical evidence on the association between austerity and economic growth is mixed and depends on the definition of austerity. Our empirical results show that the choice of the austerity measure influences the relationship between austerity and growth and that strategic selection of methods and measures allows scholars to arrive at any desired results about the economic effects of austerity periods.

2. Austerity and fiscal consolidation in economics journals

2.1 Austerity in the top 400 journals: overview

We examine papers published in the top 400 journals based on the RePEc ranking.[3] We have chosen the top 400 journals to (a) investigate a sample that is large enough to derive reliable statistical inferences and (b) to set the focus on (high) quality research (clearly, one may equally investigate 300, 500, etc. journals). Data is available since January 1990. Our sample period is January 1990 through November 2018. Figure 2 shows how often papers published in individual journals used the term austerity in the title. In 59 out of the 400 journals, papers were published that included the term austerity in the title. The sample includes 98 austerity papers overall (compared to 383 when considering all 3,122 journals listed in RePEc). In many journals, however, just one paper was published that included the term austerity in the title over the period January 1990 through November 2018. The front-runners in publishing austerity papers are the Cambridge Journal of Regions (CJR, 16 papers), Cambridge Journal of Economics (CJE, 11 papers) and the Journal of Post Keynesian Economics (JPKE, 4 papers). Two of these front-runners (CJE and JPKE) are heterodox (the Association of Heterodox Economics provides a list of heterodox journals that we use; see Lee and Cronin, 2010). One austerity paper was also published in a flagship economics journal such as the Journal of Public Economics, the Economic Journal, and the Journal of the European Economic Association. There was, however, no austerity paper published in a TOP5 journal.

Figure 3 shows the economic fields to which austerity papers belong. Most articles refer to macroeconomics (46) or public finance (32). These fields account for roughly one half of all published papers that use the term austerity in the title (152).[4] Other papers are from regional

[3] For a description of the RePEc ranking see, for example, Meyer and Wohlrabe (2018). On ranking economics journals and performance of individual scholars and institutes see, for example, Ursprung and Zimmer (2007), Hofmeister and Ursprung (2008), Rauber and Ursprung (2008), Krapf (2011), Krapf and Schläpfer (2012), Zimmerman (2013), and Sturm and Ursprung (2017).

[4] In some cases, papers cannot be clearly classified as belonging to one distinct field. We assigned these articles (54 in total) to a maximum of two fields.

economics (16), welfare economics (7), gender studies (7), development (7), political economy (6), and economic history (5).

2.2 Austerity in the top 400 journals: determinants

The number of austerity papers published in an individual journal is a discrete, nonnegative integer h. We assume the stochastic model for h to be a Poisson process with distribution

$$\Pr[H = h] = \frac{e^{-\mu}\mu^h}{h!}, \qquad h = 0,1,2,\ldots \tag{1}$$

and intensity parameter μ. Our sample includes $i = 1, \ldots, n$ journals. We use the exponential mean parametrization

$$\mu_i = \exp(\mathbf{x}_i'\boldsymbol{\beta}) = \exp(\alpha + \beta_1 \text{Heterodox} + \beta_2 \text{Ranking} + \beta_3 \text{Cambridge} + \beta_4 \text{Year}) \tag{2}$$

to derive the Poisson regression model from the Poisson distribution. $\text{Heterodox} \in (0,1)$ is a dummy variable that assumes the value one when the journal is listed as heterodox by the Association of Heterodox Economics (Lee and Cronin, 2010), $\text{Ranking} \in (0,400)$ measures the rank of the individual journal in the IDEAS/RePEc Ranking, $\text{Cambridge} \in (0,1)$ considers whether the individual journal is a Cambridge journal, and Year denotes the average year of papers with the term austerity in titles published in i. Under the assumption that $(h_i|\boldsymbol{x}_i)$ are independent, Equation (2) can be estimated by Maximum Likelihood with log-likelihood function

$$\ln L(\boldsymbol{\beta}) = \sum_{i=1}^{400} \{h_i \mathbf{x}_i'\boldsymbol{\beta} - \exp(\mathbf{x}_i'\boldsymbol{\beta}) - \ln h_i!\}. \tag{3}$$

The equality of mean and variance underlying the Poisson distribution makes the Poisson regression intrinsically heteroskedastic, which is why we (i) estimate the model with robust standard errors and (ii) compare the outcomes with results from Negative Binomial regressions.

We also investigate what predicts the chance that an individual journal has published an austerity paper, the number of papers notwithstanding. The dependent variable $\tilde{h}_i \in (0,1)$

assumes the value one when the individual journal has published an austerity paper and is zero otherwise. We examine the probability that a journal publishes a paper on austerity via

$$\tilde{h}_i = \Pr\left[\tilde{h}_i = 1 \middle| \mathbf{x}_i\right] = \Phi(\mathbf{x}_i'\boldsymbol{\beta}), \tag{4}$$

and compare the outcomes with those obtained from logistic regressions. We also estimate the models by Ordinary Least Squares (OLS) for robustness tests.

The results in Table 1 show point estimates of the count data, binary response, and OLS estimations. The variable Heterodox is positively related to the number of austerity papers published in an individual journal (Columns 1-3) and the probability that a journal publishes a paper with the term austerity in the title (Columns 4-7). The effect is statistically significant at the 1% level. Heterodox journals are thus more likely to publish papers that include the term austerity in the title than mainstream journals. Numerically, the parameter estimates suggest that the probability that journal i has published at least one paper using the term austerity in the title is 33% higher for heterodox journals than for their non-heterodox counterparts.

The dummy variable for Cambridge journals has the expected positive sign and is statistically significant in most cases. In contrast, the variable Ranking lacks statistical significance, indicating that the rank of an individual journal does not correlate with the probability of publishing a paper that includes the term austerity in its title. The variable Year is positively associated with the number of austerity papers. The effect is statistically significant at the 1% level and suggests that interest in studies on austerity has intensified in recent years.

Columns 8-10 of Table 1 show OLS estimations, which confirm the results based on the count data and binary choice models. These estimates are likely to be biased; however, the conditional correlations corroborate the effects found in Columns 1-7.

We extend the analysis and consider papers that use the term austerity in the abstract or keywords. Figure 4 shows that compared to use of the term in the title, scholars use the term austerity more often in the abstract and less often as a keyword. The sample of papers published in the top 400 journals includes 197 papers that use the term austerity in the abstract and 51

papers that use the term austerity as a keyword. Around 80% of the papers that use the term austerity in the title use it in the abstract as well. Figure 4 also shows descriptive statistics for the papers published in the top 200 journals, which point to a similar pattern. We examine the contents of the austerity papers published in the top 200 journals in greater detail in Section 2.2.

Table 2 reports the results when we re-estimate our count data and binary response model based on use of the term "austerity" in abstracts and keywords of articles published in top 400 journals, with little effect on inference. The coefficient of the heterodox variable is statistically significant at the 1% level, and we again observe that Cambridge journals publish an above-average number of austerity papers. Similar to the results in Table 1, the ranking of the journal does not predict whether a journal publishes an austerity paper, but scholars have used the term austerity more frequently over time.

We use several additional regressions to examine whether the results are robust. First, we re-estimate our count data model under the assumption that h_i follows a Negative Binomial distribution, which can be viewed as a Gamma mixture of Poisson random variables. The distribution of Equation (1) adjusts to

$$\Pr[H = h] = \frac{e^{-v\mu}(v\mu)^h}{\Gamma(h+1)}, \qquad h = 0,1,2,\ldots \tag{5}$$

where v is an unobserved parameter with a Gamma $(1/\alpha, \alpha)$ density. The results (not shown) support our results based on the Poisson distribution and deliver comparable parameter estimates (the effect of Heterodox in Column 1 is 1.956 for the Poisson model and 1.975 for the Negative Binomial model). Second, we focus on the sample of the top 200 journals and obtain very similar results. Third, we exclude journals that published only one austerity paper to account for outliers. There are 47 journals that published only one paper with the term austerity in the title, and excluding these journals gives rise to parameter estimates that are qualitatively comparable but much larger in size (the effect of Heterodox in Column 1 based

on all journals is 1.956 and increases to 2.732 when considering only journals with multiple austerity papers).

2.3 Austerity in the top 200 journals – a more detailed analysis

We investigate the austerity papers published in the top 200 journals in some more detail. Figure 5 shows descriptive statistics of the 45 studies in our sample. The average year of publication is 2013, indicating that interest in research on austerity increased during the past years. More than 75% of the papers are empirical and employ panel data, often for OECD countries. On average, a study used data for 6.57 countries and 15.37 years. The sample of these empirical studies started in the year 1996 on average (the earliest is the year 1880 in the study by Konzelmann, 2014). Studies on austerity are extremely well cited. The average austerity paper received 65.62 citations – a good deal better than the average paper published in the American Economic Review, with 43.48 citations. The highest number of citations (a total of 1,257) was counted for the paper by Korpi and Palme (2003) in the American Political Science Review. Empirical austerity papers had some 80 citations on average and theoretical austerity papers had some 20. The average rank of a journal in which an austerity paper was published is 113. Descriptive statistics for papers that use the term austerity in the abstract and keywords are similar. When considering the abstract and keywords, the average rank of a journal in which an austerity paper was published is 102. Table A1 in the appendix provides a detailed list of the austerity papers published in the top 200 journals.

2.4 "Austerity" vs. "Fiscal Consolidation"

One may well maintain that studies on austerity deal with an important issue that is certainly not ideology-induced: many industrialized countries had to reduce their budget deficits in the aftermath of the financial crisis. The question is, however, how the issue being investigated is named. An alternative to the term austerity is the term fiscal consolidation. Similar to Section

2.2, we also collected data on studies that use the term fiscal consolidation in the title, abstract, and keywords. Figure 6 shows how often scholars used the term fiscal consolidation compared to the term austerity. Among the papers published in the top 400 journals, 98 papers included the term austerity and 90 papers included the term fiscal consolidation in the title. Use of the term is also quite balanced for abstracts (austerity: 197; fiscal consolidation: 212) and keywords (austerity: 51; fiscal consolidation: 30). Figure 6 also shows the number of overlaps between austerity and fiscal consolidation. This category shows the number of papers with the term austerity in the title that were published in a top 400 journal that also published at least one paper with the term fiscal consolidation in the title. For titles, the overlap is only 42%, indicating that some journals clearly prefer one term over the other. For abstract (65%) and keywords (59%), the overlap is larger.

To examine differences in the usage of the term fiscal consolidation compared with the term austerity, we re-estimate the econometric models described in Equations (1)-(5). Table 3 shows the baseline results for when the term is used in the title, Table 4 considers articles that use the term in the abstract and keywords. The results reveal some major differences compared to austerity articles: there is no significant relationship between the variable Heterodox and the number of papers using the term fiscal consolidation in the title. Unlike austerity papers, articles using the term fiscal consolidation are not more likely to be published in heterodox journals. The coefficient relating to the rank of an individual journal has a negative sign and is statistically significant in the Count Data Models (Columns 1-3) and the OLS estimations (Columns 8-10), indicating that the term fiscal consolidation is more frequently used in well-ranked journals.

3. The measurement of austerity: ambiguous

3.1 Concepts to measure austerity

We describe how austerity is measured in the 45 studies that have been published in the top 200 journals. Scholars use various indicators to measure periods of austerity. The earliest study with the term "austerity" in the title uses cutbacks in expenditures to classify austerity periods (Newhouse, 1982), and many subsequent studies follow this approach (Ball and Feltenstein, 2001; Korpi and Palme, 2003; Benhabib et al., 2014; Çufadar and Özatay, 2017; Rickman and Wang, 2018). These expenditure-based measures of austerity may be described as "simple measures", because they examine changes in individual fiscal variables at a given point in time. Other studies employ tax increases (Breuillé and Gary-Bobo, 2007; Pappadà and Zylberberg, 2017; Kaplanoglu and Rapanos, 2018) and debt-to-GDP ratios (Müller, 2013; Honohan, 2016; Cherif and Hasanov, 2018).

Simple measures have inevitable statistical problems. Most importantly, fiscal time series are exposed to cyclical variations in GDP and it is impossible to detect whether changes in the examined measures reflect economic upswings and downswings or political intentions to reduce state deficits. To overcome this shortcoming, scholars have developed more sophisticated methods to classify periods of austerity. Two approaches have been particularly successful: the Cyclically Adjusted Primary Balance (CAPB) and the Narrative Approach (NA). The CAPB method disentangles how cyclical movements influence the primary balance to investigate the fiscal stance underlying fiscal policy measures. The method focuses on the primary balance (net borrowing or net lending, excluding interest payments on consolidated government liabilities), because interest payments are often not correlated with cyclical output changes (Blanchard, 1993; Alesina and Perotti, 1995).

The CAPB approach has been predominant in a generation of austerity papers (Alesina and Ardagna, 2010; Jorda and Taylor, 2016; Yang et al, 2015), but it cannot resolve all the statistical problems of simple measures. First, CAPB fails to remove sharp swings in asset

prices and economic activity from fiscal time series, and may provide particularly instable results in times when a boom in the stock market increases capital gains and tax revenues (Devries et al., 2011). Second, even when the change in CAPB is not directly correlated with cyclical fluctuations, it may reflect fiscal policy actions that are designed to respond to cyclical movements.

Building on Romer and Romer (2010), who examine tax changes in the United States, the NA approach aims to identify fiscal policy measures that are primarily motivated by deficit reduction (Devries et al., 2011; Guajardo et al., 2014). To classify the intentions of policymakers underlying individual fiscal actions, the NA method typically considers manifold policy documents, including budgets, budget speeches, central bank reports, convergence and stability programs submitted to the European Commission, and IMF and OECD reports.

While the Narrative Approach reduces the problem of the classification of austerity being correlated with cyclical components, it gives rise to new statistical pitfalls. First, the assessment of whether and how much a policy measure is motivated by fiscal consolidation is subjective, and official government documents may well be afflicted by strategic reporting of the incumbent to maintain political power. Second, it is difficult to compare policy measures between countries and periods, as each country-year observation may be affected by specific political circumstances. The Narrative Approach relies on many assumptions, and the classification outcome is a "black box" that is often difficult to open for users of NA datasets (for a detailed critique, see Perotti, 2013). Moreover, Jordà and Taylor (2016) show that periods of austerity classified by the Narrative Approach are not exogenous and can be predicted with macroeconomic variables. Hence, many NA-austerity periods reflect endogenous reactions of policymakers to counter economic activities (see also Section 4).

The most extensive data collection of CAPB is compiled by Alesina and Ardagna (2010), who classify austerity for 21 OECD countries for a maximum time period from 1970

to 2007.[5] The most widely used database on NA measures is collected by a consortium of IMF researchers (Devries et al., 2011; Guajardo et al., 2014). The database includes observations from 17 OECD countries during 1978-2009[6] and Alesina et al. (2015, 2017, 2019) extend this dataset to cover the period 1978-2014. The most recent version of this dataset also distinguishes between many different expenditure-based and tax-based policy measures (see Alesina et al., 2019).

3.2 Comparison of austerity measures

When we use data from the most widely used simple measures of austerity (debt-to-GDP ratio, tax revenues and government spending, all from World Bank, 2019), CAPB (Alesina and Ardagna, 2010), and NA (Devries et al., 2011; Alesina et al., 2019), the sample of country-years for which each indicator provides data includes 398 observations.[7] Figure 7 compares the classification outcome of these indicators. To make the individual measures comparable, we recode each variable to assume a value of 1 if the indicator classifies a country-year observation as austerity, and 0 otherwise ("austerity treatment"). Figure 7 shows that in 335 cases, at least *one* indicator classifies a country-year observation as austerity. This implies that austerity is omnipresent (84% of all country-years), and that very few country-years ($N = 63$; 16% of all observations) are *not* classified as periods of austerity. The picture changes fundamentally if we look at periods for which *each* indicator signals austerity. In this case, only 10 country-years (2.5% of all observations) are classified as austerity periods.

One may argue that these strong deviations are based on the large number of different measures. Inferences are also ambiguous, however, when we only focus on the CAPB and NA.

[5] The countries include Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, and United States.
[6] The countries include Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Netherlands, Portugal, Spain, Sweden, United Kingdom, and United States.
[7] Note that this number slightly deviates from the common sample reported in Panel B of Table 5 (N=412), as the analysis of Figure 6 requires using *changes* in taxes and spending rather than levels.

The number of country-years which at least one indicator classifies as austerity is again large ($N = 305$; roughly 60% of all observations), and the number of observations for which both measures imply austerity is much smaller ($N = 124$).

The austerity measures are likely to suffer from measurement error when individual austerity measures classify different country-year observations as periods of austerity. The measurement errors raise the question of the relative quality of the austerity indicators: are there austerity measures that classify periods of austerity more (less) accurately than others? Clearly, we cannot observe the "true" treatment. We believe, however, that comparing the individual country-year observations with violations of the euro convergence criteria ("Maastricht criteria") is useful. The Maastricht criteria are a promising benchmark, because fiscal consolidation would ideally require the euro convergence criteria to be fulfilled.[8] Doing so has two disadvantages: (i) we focus on the euro member states, and (ii) there may be cases in which a violation of the Maastricht criteria is accompanied by serious efforts to consolidate budgets, e.g. if initial debt-to-GDP is so high that a reduction takes several years.

Figure 8 shows the share of country-year observations with violations of the Maastricht criteria that are classified as austerity. On average, the austerity indicators classify 35.9% of the observations with Maastricht violations as periods of austerity. The overlap between periods classified as austerity and violations of the Maastricht Treaty is quite pronounced on average and differs across measures: it is lowest for the CAPB method and the NA of Devries et al., 2011 (roughly 25%), and highest for simple measures of austerity (roughly 48%).

Overall, the comparison of the available austerity measures shows that the classification outcome differs between methods, and the comparison with the Maastricht criteria suggests that many of the identified periods of austerity are questionable.

[8] Regarding national budgets, the Maastricht criteria require that (i) the ratio of the annual general government deficit must not exceed 3% relative to GDP at the end of the preceding fiscal year and (ii) the debt-to-GDP ratio must not exceed 60% of GDP. If the debt-to-GDP ratio is higher than 60% of GDP, the Maastricht criteria may still be fulfilled if debt-to-GDP has sufficiently diminished and approaches the reference value at a "satisfactory pace", which is defined in detail in Article 140 of the Treaty on the Functioning of the European Union.

4. Consequences

Scholars measure austerity in manifold ways. Differences in measuring austerity, in turn, influence results on the austerity-growth nexus. Based on changes in CAPB to classify periods of austerity, Alesina and Ardagna (2010) report evidence on *expansionary austerity*, i.e. positive stimuli on economic growth based on fiscal adjustments. On the demand side, positive effects of fiscal consolidation on economic growth are likely to arise because agents believe that the current policies prevent much more disruptive fiscal adjustments in the future (Blanchard, 1990) or because fiscal consolidation gives rise to decreasing interest rates on government bonds (Alesina and Ardagna, 2010). On the supply side, the effect of fiscal consolidation on economic on growth depends on whether it is implemented via tax increases or via spending cuts. While tax increases decrease labor supply in neoclassical labor markets, spending cuts increase incentives to participate in the labor market. The supply-side effect also depends on the unions' ability to translate tax increases into pre-tax wages (for a detailed description, see Alesina and Ardagna, 1998; Alesina et al., 2002). Using austerity periods measured via the Narrative Approach by Devries et al. (2011), Guajardo et al. (2014) challenge the optimistic view on how fiscal consolidation influences economic growth. The results provide evidence for *contractionary austerity*, i.e. negative effects of fiscal consolidation on economic growth. Such negative effects reflect the classical Keynesian view, which describes decreasing aggregate demand as reducing growth. Alesina et al. (2015, 2017, 2019) extend the Narrative Approach of Devries et al. (2011) and Guajardo et al. (2014) to cover the period 1978-2014. Also, the authors include detailed information on budget composition that influences fiscal consolidation. The results show that even when measured with the Narrative Approach, austerity may well be expansionary if government spending cuts are overcompensated by increases in other components of aggregate demand. In a nutshell, the empirical results on the austerity-growth nexus are mixed.

We examine the extent to which using individual measures for fiscal consolidation influences the austerity-growth nexus. Following the growth regression of Acemoglu et al. (2019) we estimate

$$y_{it} = \beta A_{it} + \sum_{j=1}^{\phi} \gamma_j y_{it-j} + \eta_i + \zeta_t + \varepsilon_{it}, \tag{6}$$

where y_{it} is the log of real per capita GDP (collected from PWT 9.0) in country i at time t, η_i is a country-level fixed effect that accounts for heterogeneity across countries in time-invariant factors, and ζ_t is a period fixed effect that compensates period-specific shocks such as economic crises. The idiosyncratic error ε_{it} includes any other time-variant unobservable shock. The standard sequential exogeneity assumption of dynamic panel models requires austerity and past incomes to be orthogonal to present and future GDP shocks and ε_{it} to be serially uncorrelated. To deal with serial correlation in the error terms, we follow Acemoglu et al. (2019) and account for GDP dynamics in Equation (6) using four lags of GDP ($\phi = 4$). This strategy is also motivated by Hamilton (2018), who shows that inclusion of four lags suffices to remove unit roots in time series. Under the sequential exogeneity assumption, Equation (6) can be estimated with the conventional within-group estimator.

The variable of interest, A_{it}, denotes the degree of austerity in country i at time t. We use the individual measures of austerity and compare the growth effects of the individual measures. Our austerity indicators include the first generation of "simple measures" (debt-to-GDP ratio, government spending in % of GDP, and tax revenues in % of GDP) collected from World Bank (2019), as well as data on changes in CAPB (Alesina and Ardagna, 2010), narrative classifications of Devries et al. (2011) and Gujardo et al. (2014), and the most recent NA classification of Alesina et al. (2019). The Alesina et al. (2019) database provides measures of both unexpected and announced fiscal adjustments. We use data on unexpected policies, because the timing and the anticipation of fiscal measures influences how the individual measures affect economic growth (Ramey, 2011; Gründler and Sauerhammer, 2018). Each

austerity variable is recoded: higher values reflect stronger levels of austerity (and vice versa). Table A2 in the appendix provides summary statistics of the variables.

Table 5 shows the results. Panel A presents the results when we estimate Equation (6) based on the broadest possible sample of countries and years available for the OECD countries (1960-2014), Panel B presents results based on a comparable sample of 16 OECD countries observed between 1980 and 2009 ($N = 412$):[9] individual austerity indicators arrive at fundamentally different conclusions about the growth effect of austerity periods. Column (1) shows that a reduction in debt-to-GDP is positively associated with economic growth. This effect is statistically significant at the 1% level. In contrast, Column (2) shows that austerity decreases economic growth if it is implemented via tax increases, while austerity increases economic growth when it is achieved by spending cuts.

The results based on the second generation of austerity measures are even more ambiguous. While austerity measured via changes in CAPB is positively related to GDP (Column 4), periods of austerity classified via NA methods tend to find a negative association between fiscal consolidation and growth (Columns 5-7). The parameter estimates of the CAPB measures are statistically significant at the 1% level. The coefficient estimates of the NA measures are statistically significant at the 5% and 10% level. The results are also inconclusive in Panel B, which re-estimates the models of Columns (1)-(7) based on a common set of country-years to rule out the possibility of a sample selection bias.

Table A3 in the appendix provides robustness checks of the baseline outcomes. Panel A uses lagged values of the austerity measures to account for a potential time lag until fiscal policies influence economic growth. Panel B deals with a potential unit root in the time series. We include four lags in our baseline specification to account for GDP dynamics and unit roots. However, to rule out that the results are driven by spurious regressions, Panel B shows results

[9] The sample includes (number of periods in parentheses) Australia (30), Austria (30), Belgium (15), Canada (20), Denmark (30), Finland (20), France (18), Germany (28), Ireland (29), Italy (30), Japan (30), Portugal (30), Spain (30), Sweden (30), the United Kingdom (12), and the United States (30).

of Equation (6) in first differences. Both adjustments of the baseline specification have little effect on the ambiguity in the austerity-growth nexus.

A threat to the identification of austerity's effect on economic growth in Equation (6) is the assumption that A_{it} and ε_{it} are uncorrelated, and that there is reverse causation between economic growth and fiscal consolidation. In fact, there are good reasons to believe that the exogeneity assumption of the austerity measures is violated (Section 3). Identification of a causal effect would require, for example, a valid instrumental variable that offers a source of exogenous variation in fiscal consolidation. The NA variables are designed to identify such periods, and may hence be used as instrumental variables for other austerity measures. Jordà and Taylor (2016) use this approach to instrument the CAPB variable and discuss the advantages and disadvantages of this strategy. We transfer Equation (6) into an instrumental variable setting, where the austerity variables from Table (5) are instrumented by austerity treatment recovered from the NA approach. The austerity treatment variable $z \in (0, 1)$ is 1 if the NA approach signals austerity, and 0 otherwise. Columns (1)-(4) of Table (6) report the results from these regressions. The results regarding how austerity influences economic growth are again inconclusive. While austerity measured via tax revenues and CAPB now suggest negative effects from periods of austerity, reducing government spending is still positively related to growth, and reducing the debt-to-GDP ratio lacks statistical significance.

The validity and the strength of the instrumental variable differ across the models of Table (6). The first-stage results and the Kleibergen-Paap rk LM test imply that austerity treatment is a suitable instrumental variable for austerity measured via tax revenues, CAPB, and – to a slightly lesser extent – reductions in government spending. It is inadequate in the case of the debt-to-GDP ratio.

The approach to instrument austerity with NA-related austerity treatments relies on the assumption that the NA indeed identifies periods in which politicians conduct fiscal policies

that aim to reduce budget deficits and that are exogenous to the economic process. Columns (5)-(7) of Table (6) investigate this assumption, estimating probit models of the form

$$z_{it} = \alpha + \psi \left(\frac{D_i}{y_i}\right)_{t-1} + \varepsilon_{it}, \tag{7}$$

where D_i is government debt in country i. The results are reported for z_{it} measured as recovered from Devries et al. (2011) (Column 5), and the tax-side (Column 6) and the spending-side (Column 7) NA measures of austerity from Alesina et al. (2019). The results show that austerity treatment periods derived from Narrative Approach are well predicted by preceding debt-to-GDP ratios. This means that the assumption of exogeneity of NA is violated (see also Jordà and Taylor, 2016). Consequently, (1) IV strategies that rely on allegedly exogenous variations in austerity policies do not help to solve the problem of reverse causation, and (2) the NA approach, like any other approach to measure austerity, simply reflects endogenous reactions of policies to economic events.

Overall, the results on the growth effects of austerity measures show that the choice of the austerity measure strongly influences the relationship between austerity and growth. Strategic selection of methods and measures allows scholars to arrive at any desired results about the economic effects of austerity periods.

5. Conclusion

Responding to the dramatic increase in public debt in the aftermath of the financial crisis (Lane, 2012), European governments have launched attempts to consolidate public budgets. These policies have often been described as times of austerity. The fiscal retrenchment caused a great deal of opposition (Afonso et al., 2015), and the economic effects of austerity policies were questioned. In fact, the economic literature disagrees about how fiscal consolidation influences economic growth, and the results of empirical studies are inconclusive.

We investigate why previous studies arrived at mixed evidence on the austerity-growth nexus and examine around 3,500 journal articles published in the top 400 journals (RePEc ranking) over the period 1990-2018. The results show that scholars use manifold definitions of austerity and that the term austerity is often used in heterodox journals. Papers published in mainstream journals use the term fiscal consolidation instead. We also find that there is no consistent use of the term austerity and that the empirical measures identify different periods as periods of austerity. We have employed panel data for 34 OECD countries over the period 1960-2014 to examine the empirical consequences of this ambiguity. The results show that depending on how austerity is measured, empirical models on the growth effect of austerity arrive at fundamentally different conclusions. Strategic selection of austerity measures allows scholars to arrive at any desired results about the economic effects of austerity periods.

Many austerity studies contain explicit policy recommendations, but policy implications are flawed if the empirical results are mixed. Scholars investigating the causes and consequences of fiscal adjustments should thus be cautious in their choice of measurement and should carefully justify their choice by expounding the theoretical underpinnings of the employed austerity measure.

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Table 1: Regression Results---"Austerity" in Scientific Journals. Dependent Variables: Papers published in Top-400 Journals with "Austerity" in Title

	Count Data Model (Poisson)			**Probit Model**		**Logit Model**		**OLS Regressions**		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	#Austerity	#Austerity	#Austerity	Pr(Austerity)	Pr(Austerity)	Pr(Austerity)	Pr(Austerity)	#Austerity	#Austerity	#Austerity
Heterodox	1.956***	1.571***	1.790***	1.021***	0.972***	1.725***	1.652***	1.257*	1.123*	1.142*
	(0.603)	(0.555)	(0.520)	(0.336)	(0.346)	(0.542)	(0.572)	(0.736)	(0.645)	(0.632)
Ranking	0.001	0.001	0.000	-0.000	-0.000	-0.000	-0.000	0.000	0.000	0.000
	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
Cambridge		2.126***	1.792***		0.763**		1.314**		1.575	1.382
		(0.564)	(0.595)		(0.324)		(0.544)		(0.968)	(0.938)
Year			0.081***							0.074***
			(0.017)							(0.021)
Constant	-1.857***	-2.003***	-2.065***	-1.096***	-1.111***	-1.852***	-1.882***	0.146**	0.123*	0.083
	(0.332)	(0.359)	(0.306)	(0.157)	(0.160)	(0.292)	(0.299)	(0.071)	(0.074)	(0.071)
Observations	400	400	400	400	400	400	400	400	400	400
(Pseud.) R-Squ.	0.080	0.196	0.256	0.027	0.044	0.027	0.044	0.051	0.142	0.198
F (χ^2) Stat	26.13	45.93	111.38	9.30	13.88	10.21	13.95	2.27	1.69	3.88
F (χ^2) p-val	0.000	0.000	0.000	0.010	0.003	0.006	0.003	0.104	0.169	0.004

Notes: The table reports regression results on the determinants of articles published in Top-400 economic journals that have the term "austerity" in the title. #Austerity denotes the total number of papers published in a journal, Pr(Austerity) is a dummy variable that is 1 if a journal has at least published one article with the term "austerity" in the title, and 0 otherwise. Huber/White-robust standard errors are reported in parentheses. (Pseud.) R-Squared reports R-squared in case of OLS (Columns 8-10), and McFadden's pseudo R-squared in case of Poisson, Probit and Logit (Columns 1-7). F (χ^2) Stat gives the Wald F statistic in case of OLS and the LR test statistic, with F (χ^2) p-val denoting the corresponding probabilities.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 2: Regression Results---"Austerity" in Scientific Journals. Dependent Variables: Papers published in Top-400 Journals with "Austerity" in Abstract and Keywords

	AUSTERITY IN ABSTRACT					AUSTERITY IN KEYWORDS				
	Count Data Model (Poisson)			**Probit Model**		**Count Data Model (Poisson)**			**Probit Model**	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	#Austerity	#Austerity	#Austerity	Pr(Austerity)	Pr(Austerity)	#Austerity	#Austerity	#Austerity	Pr(Austerity)	Pr(Austerity)
Heterodox	1.982***	1.747***	1.807***	1.047***	1.017***	1.891***	1.566**	1.690**	1.173***	1.160***
	(0.496)	(0.404)	(0.384)	(0.340)	(0.345)	(0.576)	(0.785)	(0.765)	(0.356)	(0.357)
Ranking	-0.000	-0.001	-0.001	-0.001*	-0.001*	0.001	0.001	0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)
Cambridge		1.499***	1.332***		0.420		1.913**	1.681*		0.165
		(0.480)	(0.476)		(0.323)		(0.958)	(1.005)		(0.419)
Year			0.051***					0.062**		
			(0.015)					(0.024)		
Constant	-0.865***	-0.931***	-0.974***	-0.554***	-0.559***	-2.575***	-2.693***	-2.729***	-1.320***	-1.321***
	(0.226)	(0.224)	(0.216)	(0.135)	(0.135)	(0.387)	(0.485)	(0.439)	(0.180)	(0.181)
Observations	400	400	400	400	400	400	400	400	400	400
Pseud. R-Squ.	0.092	0.147	0.163	0.026	0.030	0.063	0.044	0.157	0.053	0.054
χ^2 Stat	24.12	35.62	57.35	11.33	12.77	23.71	48.60	69.39	12.08	12.61
χ^2 p-val	0.000	0.000	0.000	0.003	0.005	0.000	0.003	0.000	0.002	0.006

Notes: The table reports regression results on the determinants of articles published in Top-400 economic journals that have the term "austerity" in the abstract or the keywords. #Austerity denotes the total number of papers published in a journal, Pr(Austerity) is a dummy variable that is 1 if a journal has at least published one article with the term "austerity" in the title, and 0 otherwise. Huber/White-robust standard errors are reported in parentheses. Pseud. R-Squ. reports McFadden's pseudo R-squared in case of Poisson and Probit. χ^2 Stat gives the Wald χ^2 statistic, with χ^2 p-val denoting the corresponding probabilities.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Regression Results---"Fiscal Consolidation" in Scientific Journals. Dependent Variables: Papers published in Top-400 Journals with "Fiscal Consolidation" in Title

	Count Data Model (Poisson)			**Probit Model**		**Logit Model**		**OLS Regressions**		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	#Fiscal C.	#Fiscal C.	#Fiscal C.	Pr(Fiscal C.)	Pr(Fiscal C.)	Pr(Fiscal C.)	Pr(Fiscal C.)	# Fiscal C.	# Fiscal C.	# Fiscal C.
Heterodox	-0.358	-0.318	-0.306	0.035	0.047	0.074	0.087	-0.061	-0.054	-0.052
	(0.671)	(0.681)	(0.680)	(0.417)	(0.408)	(0.777)	(0.765)	(0.092)	(0.093)	(0.093)
Ranking	-0.003***	-0.003***	-0.003***	-0.001	-0.001	-0.001	-0.001	-0.001***	-0.001**	-0.001**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
Cambridge		-0.537	-0.620		-0.081**		-0.154		-0.082	-0.107
		(0.687)	(0.688)		(0.390)		(0.748)		(0.082)	(0.085)
Year			0.029							0.010
			(0.021)							(0.008)
Constant	-1.884***	-0.879***	-0.905***	-0.912***	-0.911***	-1.513***	-1.511***	0.375***	0.376***	0.371***
	(0.264)	(0.264)	(0.263)	(0.148)	(0.148)	(0.263)	(0.264)	(0.084)	(0.084)	(0.084)
Observations	400	400	400	400	400	400	400	400	400	400
(Pseud.) R-Squ.	0.026	0.027	0.030	0.010	0.007	0.006	0.006	0.014	0.015	0.017
F (χ^2) Stat	9.41	9.57	11.58	2.31	2.34	2.30	2.33	3.50	2.42	1.96
F (χ^2) p-val	0.009	0.023	0.021	0.315	0.506	0.317	0.507	0.031	0.066	0.100

Notes: The table reports regression results on the determinants of articles published in Top-400 economic journals that have the term "fiscal consolidation" in the title. # Fiscal C. denotes the total number of papers published in a journal, Pr(Fiscal C.) is a dummy variable that is 1 if a journal has at least published one article with the term "fiscal consolidation" in the title, and 0 otherwise. Huber/White-robust standard errors are reported in parentheses. (Pseud.) R-Squared reports R-squared in case of OLS (Columns 8-10), and McFadden's pseudo R-squared in case of Poisson, Probit and Logit (Columns 1-7). F (χ^2) Stat gives the Wald F statistic in case of OLS and the LR test statistic, with F (χ^2) p-val denoting the corresponding probabilities.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Regression Results---"Fiscal Consolidation" in Scientific Journals. Dependent Variables: Papers published in Top-400 Journals with "Fiscal Consolidation" in Abstract and Keywords

	FISCAL CONSOLIDATION IN ABSTRACT					FISCAL CONSOLIDATION IN KEYWORDS				
	Count Data Model (Poisson)			**Probit Model**		**Count Data Model (Poisson)**			**Probit Model**	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	#Fiscal C.	#Fiscal C.	#Fiscal C.	Pr(Fiscal C.)	Pr(Fiscal C.)	#Fiscal C.	#Fiscal C.	#Fiscal C.	P(Fiscal C.)	P(Fiscal C.)
Heterodox	-0.007	0.056	0.061	0.195	0.214	0.913	0.967	0.977	0.632*	0.644*
	(0.593)	(0.600)	(0.600)	(0.359)	(0.361)	(0.601)	(0.603)	(0.602)	(0.379)	(0.383)
Ranking	-0.002***	-0.002***	-0.002***	-0.001	-0.001	-0.002	-0.002	-0.003	-0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
Cambridge		-1.079**	1.121**		-0.197		-0.855	-0.930		0.214
		(0.540)	(0.541)		(0.356)		(1.024)	(1.022)		(0.513)
Year			0.016					0.027		
			(0.019)					(0.020)		
Constant	-0.190	-0.182	-0.194	-0.639***	-0.636***	-1.729***	-1.721***	-1.402***	-1.402***	-1.401***
	(0.219)	(0.219)	(0.218)	(0.135)	(0.135)	(0.382)	(0.382)	(0.173)	(0.173)	(0.174)
Observations	400	400	400	400	400	400	400	400	400	400
Pseud. R-Squ.	0.016	0.021	0.022	0.004	0.004	0.014	0.017	0.019	0.012	0.012
χ^2 Stat	7.56	11.48	11.99	1.76	2.12	5.02	5.19	6.85	2.99	3.01
χ^2 p-val	0.023	0.009	0.017	0.415	0.549	0.081	0.158	0.144	0.224	0.390

Notes: The table reports regression results on the determinants of articles published in Top-400 economic journals that have the term "fiscal consolidation" in the abstract or the keywords. #Fiscal C. denotes the total number of papers published in a journal, Pr(Fiscal C.) is a dummy variable that is 1 if a journal has at least published one article with the term "fiscal consolidation" in the title, and 0 otherwise. Huber/White-robust standard errors are reported in parentheses. Pseud. R-Squ. reports McFadden's pseudo R-squared in case of Poisson and Probit. χ^2 Stat gives the Wald χ^2 statistic, with χ^2 p-val denoting the corresponding probabilities.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Regression Results---The Effect of Austerity Measures on Economic Growth

	1st GENERATION: SIMPLE MEASURES			2nd GENERATION: CAPB AND NARRATIVE APPROACH			
	(1) Debt (Reduction)	(2) Tax (Revenue)	(3) Gov. Spend. (Reduction)	(4) CAPB (Alesina & Ardagna)	(5) Narrative Ap. (Devries et. al)	(6) Narrative: Tax (Alesina et al.)	(7) Narrative: Spend (Alesina et al.)
	Panel A: All available observations						
Austerity	0.005***	-0.001**	0.003***	0.138***	-0.270**	-0.005*	-0.002*
	(0.001)	(0.000)	(0.001)	(0.040)	(0.117)	(0.002)	(0.001)
Log(GDP^{pc}) $(t-1)$	1.265***	1.298***	1.244***	1.427***	1.429***	1.393***	1.397***
	(0.079)	(0.041)	(0.039)	(0.083)	(0.080)	(0.077)	(0.080)
Log(GDP^{pc}) $(t-2)$	-0.320***	-0.348***	-0.272***	-0.502***	-0.518***	-0.457***	-0.465***
	(0.114)	(0.054)	(0.058)	(0.111)	(0.122)	(0.112)	(0.112)
Log(GDP^{pc}) $(t-3)$	0.009	0.082**	0.038	0.127*	0.114	0.097	0.105
	(0.059)	(0.040)	(0.029)	(0.070)	(0.079)	(0.065)	(0.065)
Log(GDP^{pc}) $(t-4)$	-0.001	-0.058*	-0.030	-0.088	-0.064	-0.063	-0.0667
	(0.029)	(0.030)	(0.023)	(0.053)	(0.054)	(0.038)	(0.041)
Observations	837	1,119	1,390	541	544	592	592
Countries	34	30	30	17	17	16	16
R-Squared	0.99	0.99	0.99	0.99	0.99	0.99	0.99
F Stat	2235	4643	7410	3337	3309	3329	3282
F p-val	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Country-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Period-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Panel B: Common sample of observations						
Austerity	0.002*	-0.001	0.002*	0.134**	-0.264*	-0.006*	-0.002
	(0.001)	(0.001)	(0.001)	(0.056)	(0.150)	(0.003)	(0.002)
Observations	412	412	412	412	412	412	412
Countries	16	16	16	16	16	16	16
R-Squared	0.99	0.99	0.99	0.99	0.99	0.99	0.99
F Stat	2272	2271	2272	2301	2291	2325	2259
F p-val	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Country-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Period-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes

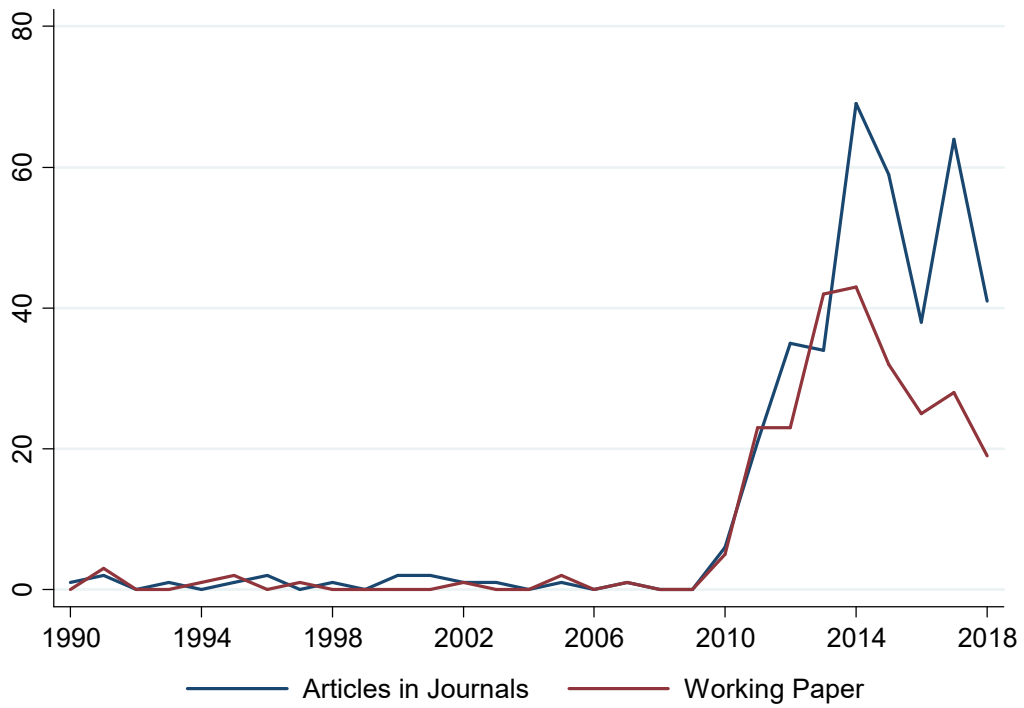
Notes: The table reports regression results on the effect of austerity on long-run economic growth, with Huber/White robust standard errors in parentheses. All regressions include country-fixed effects and period-fixed effects. The austerity measures are as follows: Column (1): Debt Reduction (World Bank, 2019), Column (2): Tax Revenues (World Bank, 2019), Column (3): Reduction in Government Spending (World Bank, 2019), Column (4): Changes in CAPB as measured by Alesina and Ardagna (2010), Column (5): Narrative Approach effect size as reported by Devries et al. (2011) and Gujardo et al. (2014), Column (6): Narrative Approach total impact of taxes (unexpected) as reported by Alesina et al., 2019, Column (7): Narrative Approach total impact of spending (unexpected) as reported by Alesina et al. (2019). * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Regression Results---The Effect of Austerity Measures on Economic Growth, IV Regressions

	IV Regressions: NA Treatment				Probit Regressions: Exogeneity of NA Approach		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Debt (Reduction)	Tax (Revenue)	Gov. Spend. (Reduction)	CAPB (Alesina & Ardagna)	Narrative Ap. (Devries et. al)	Narrative: Tax (Alesina et al.)	Narrative: Spend (Alesina et al.)
Austerity	0.078	-0.004**	0.012**	-0.429***			
	(0.066)	(0.002)	(0.006)	(0.162)			
Log(GDP^{pc}) $(t-1)$	1.122***	1.483***	1.182***	1.454***			
	(0.334)	(0.062)	(0.153)	(0.0645)			
Log(GDP^{pc}) $(t-2)$	-0.447*	-0.599***	-0.382***	-0.540***			
	(0.271)	(0.111)	(0.148)	(0.112)			
Log(GDP^{pc}) $(t-3)$	-0.155	0.244**	0.100	0.096			
	(0.314)	(0.100)	(0.123)	(0.095)			
Log(GDP^{pc}) $(t-4)$	0.307	-0.194***	0.056	-0.066			
	(0.337)	(0.067)	(0.102)	(0.052)			
Debt-to-GDP $(t-1)$					0.187**	0.178**	0.254***
					(0.086)	(0.087)	(0.91)
Observations	468	515	544	541	434	405	421
Countries	17	17	17	17	17	16	16
R-Squared	0.96	0.99	0.99	0.99	0.15	0.12	0.15
$F(\chi^2)$ Stat	394	2407	1685	2711	70.47	48.19	58.27
$F\ (\chi^2)$ p-val	0.000	0.000	0.000	0.000	0.000	0.010	0.001
First-stage	-3.214	57.95***	22.45**	0.664***			
Kleibergen-Paap	1.680	13.74	5.14	43.56			
Stock-Yogo (20%)	6.66	6.66	6.66	6.66			
Country-Effects	Yes	Yes	Yes	Yes	No	No	No
Period-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Columns (1)-(4) report IV regression results on the effect of austerity on economic growth, where the individual variables (denoted in first row) are instrumented with austerity treatment recovered from the NA approach (Devries et al., 2011). Columns (5)-(6) present probit estimates on the effect of lagged debt-to-GDP on the austerity treatment implied by the NA approach. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure 1: Number of Papers that use the term "Austerity" in the Titles published in Scientific Journals and Working Paper Series, 1990-2018.

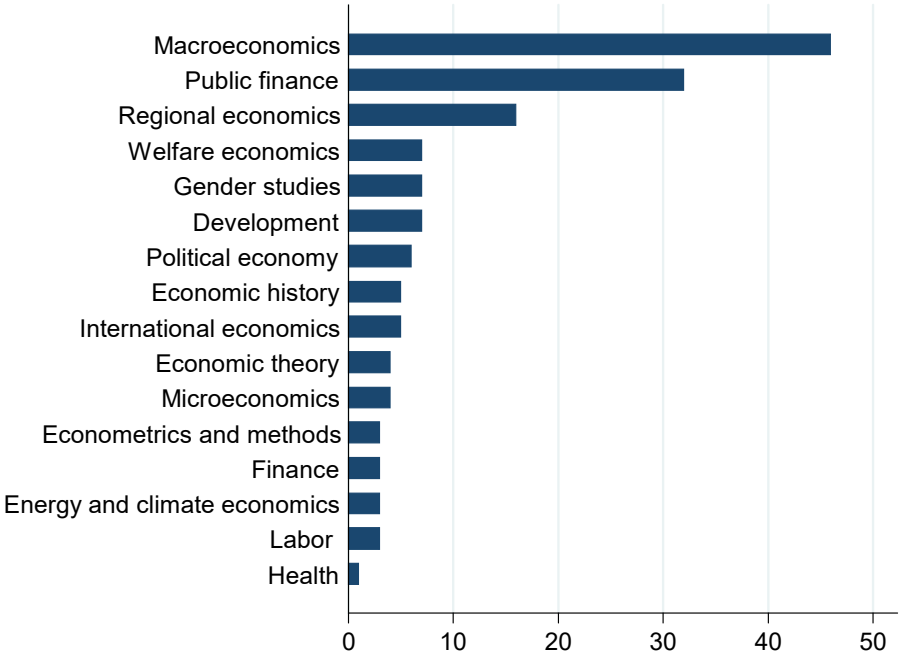


Notes: Numbers are collected using the RePEc database. RePEc comprises 3,122 scientific journals and 4,893 working paper series. In December 2018, RePEc includes more than 460,000 discussion papers, 720,000 journal articles and 30,000 books and chapters. The figure counts each paper that uses the term in the title and considers each listed journal and each listed working paper series (status as of December 2018).

Figure 2: Top-400 Journals in economics that have published at least one article with the term "austerity" in the title. The graph shows the total number since foundation of the journals.

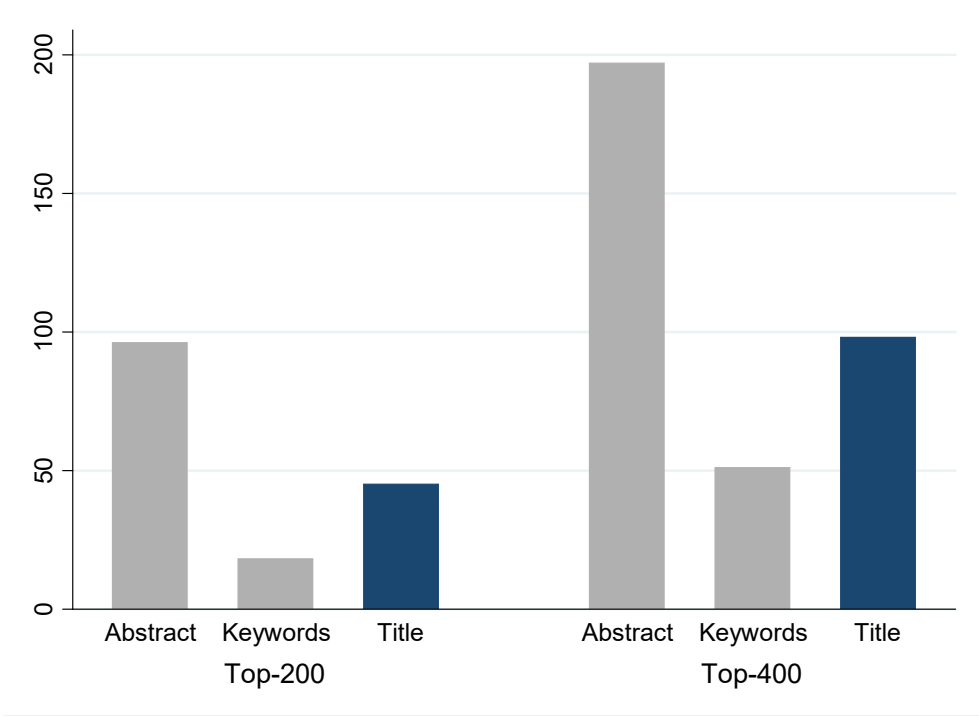
Notes: Numbers are collected using the RePEc database. RePEc comprises 3,122 scientific journals and 4,893 working paper series. In December 2018, RePEc includes more than 460,000 discussion papers, 720,000 journal articles and 30,000 books and chapters. The figure counts the number of papers published in a Top-400 journal that use the term in the title (status as of December 2018). Top-400 with no austerity paper (341 journals) are not listed.

Figure 3: Fields of Papers that use the term "Austerity" in Titles in Scientific Journals, Abstracts, and Keywords of Scientific Journals, Top-400.



Notes: Numbers are collected using the RePEc database. RePEc comprises 3,122 scientific journals and 4,893 working paper series. In December 2018, RePEc includes more than 460,000 discussion papers, 720,000 journal articles and 30,000 books and chapters. The figure counts each paper that uses the term in the title and that has been published in a Top-400 journal (status as of December 2018). In cases when the article cannot be distinctively assigned to a single field, we assign a maximum of two fields to the article.

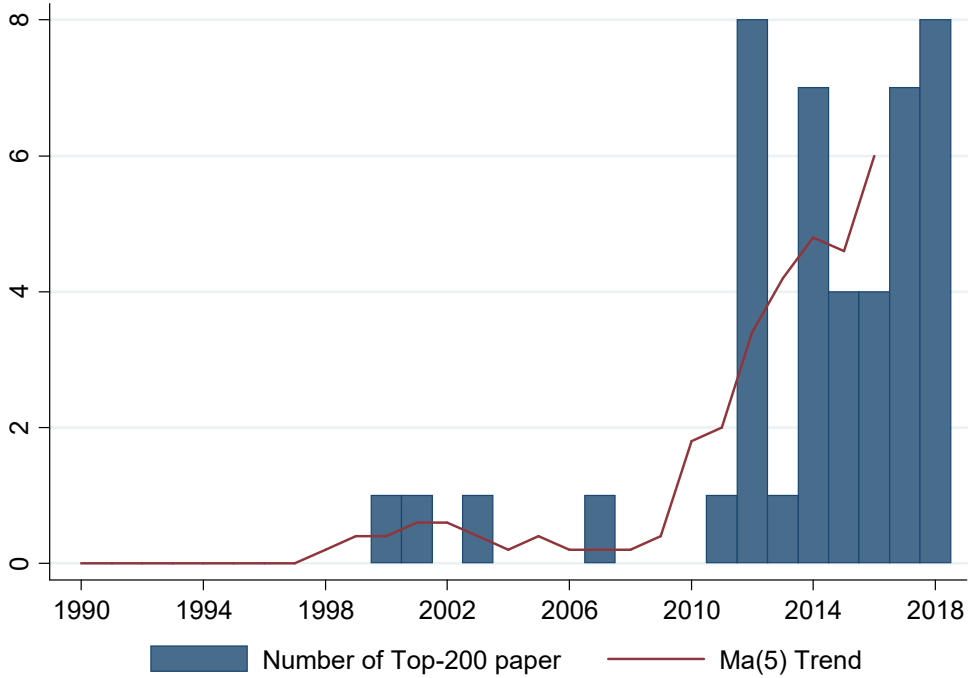
Figure 4: Number of Papers that use the term "Austerity" in Titles, Abstracts, and Keywords of Scientific Journals, Top-200 and Top-400.



Notes: Numbers are collected using the RePEc database. RePEc comprises 3,122 scientific journals and 4,893 working paper series. In December 2018, RePEc includes more than 460,000 discussion papers, 720,000 journal articles and 30,000 books and chapters. The figure counts each paper that uses the term in the title, abstract or keywords (including overlaps) in the Top-200 and Top-400, respectively (status as of December 2018).

Figure 5: Descriptive Statistics of Papers published in Scientific Journals that use the term "Austerity" in the Titles, Top-200.

Panel A: Development of Austerity Articles in Top-200 Journals

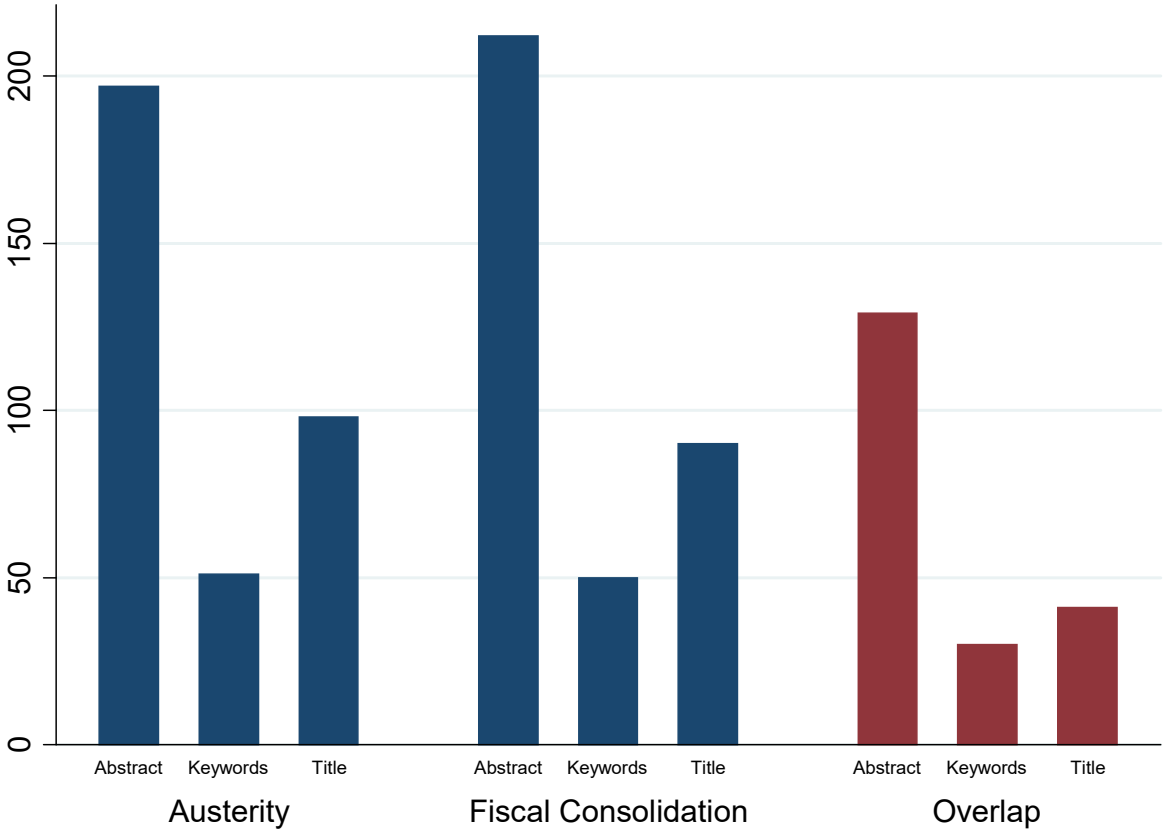


Panel B: Descriptive Statistics of Austerity Articles in Top-200 Journals

Statistic	Value
Number of studies	45
Publication years (mean)	2013.28
Number of included countries (mean)	6.57 countries
Number of included periods (mean)	15.37 years
Start year (mean)	1996.70 (Min: 1880)
End year (mean)	2010.67 (Max: 2016)
Theory studies	24.44%
Number of RePEc citations	65.62 (Min: 0, Max: 1,257)
(a) Theory papers	20.45 (Min: 0, Max: 89)
(b) Empirical papers	80.24 (Min: 0, Max: 1,257)
IDEAS Ranking of the journal (mean)	112.73 (Min: 9, Max: 196)

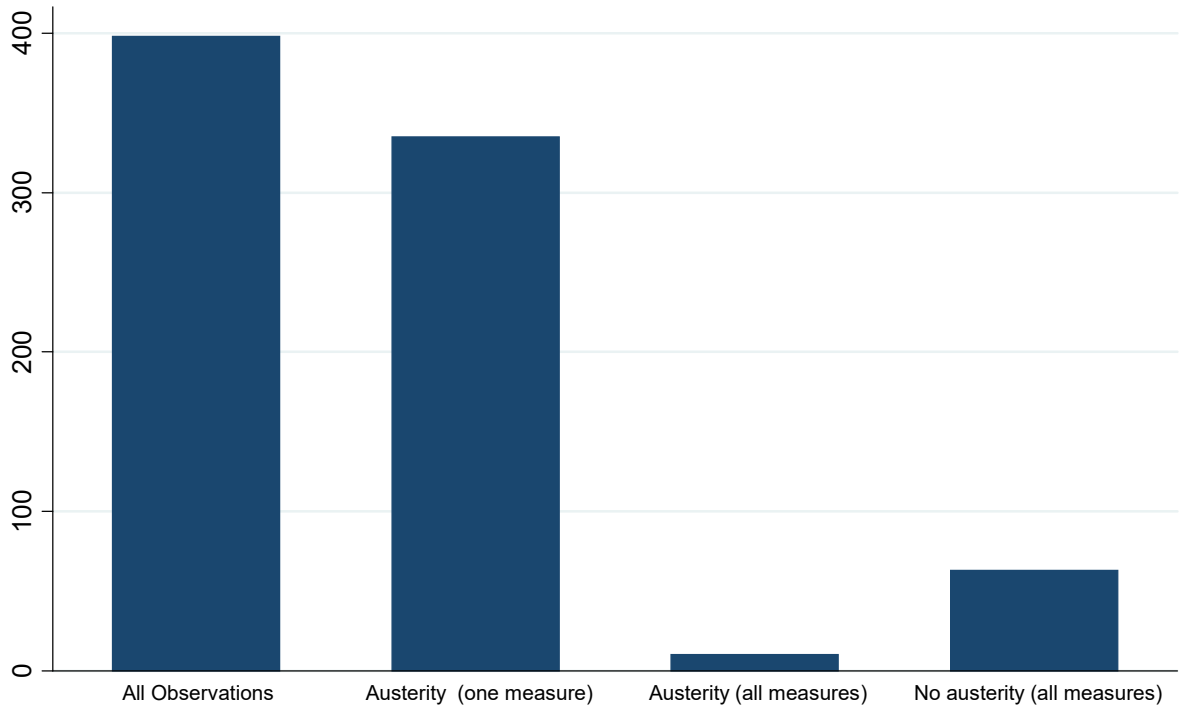
Notes: Numbers are collected using the RePEc database. RePEc comprises 3,122 scientific journals and 4,893 working paper series. In December 2018, RePEc includes more than 460,000 discussion papers, 720,000 journal articles and 30,000 books and chapters. Left panel: The figure counts each paper that uses the term in the title and that has been published in one of the best 200 journals (status as of December 2018). The trend displays the moving average of 5th order. Right panel: The table shows descriptive statistics of articles published in Top-200 journals that use the term "austerity" in the title.

Figure 6: Number of Papers that use the term "Austerity" and "Fiscal Consolidation" in Titles, Abstracts, and Keywords of Scientific Journals, Top-400.



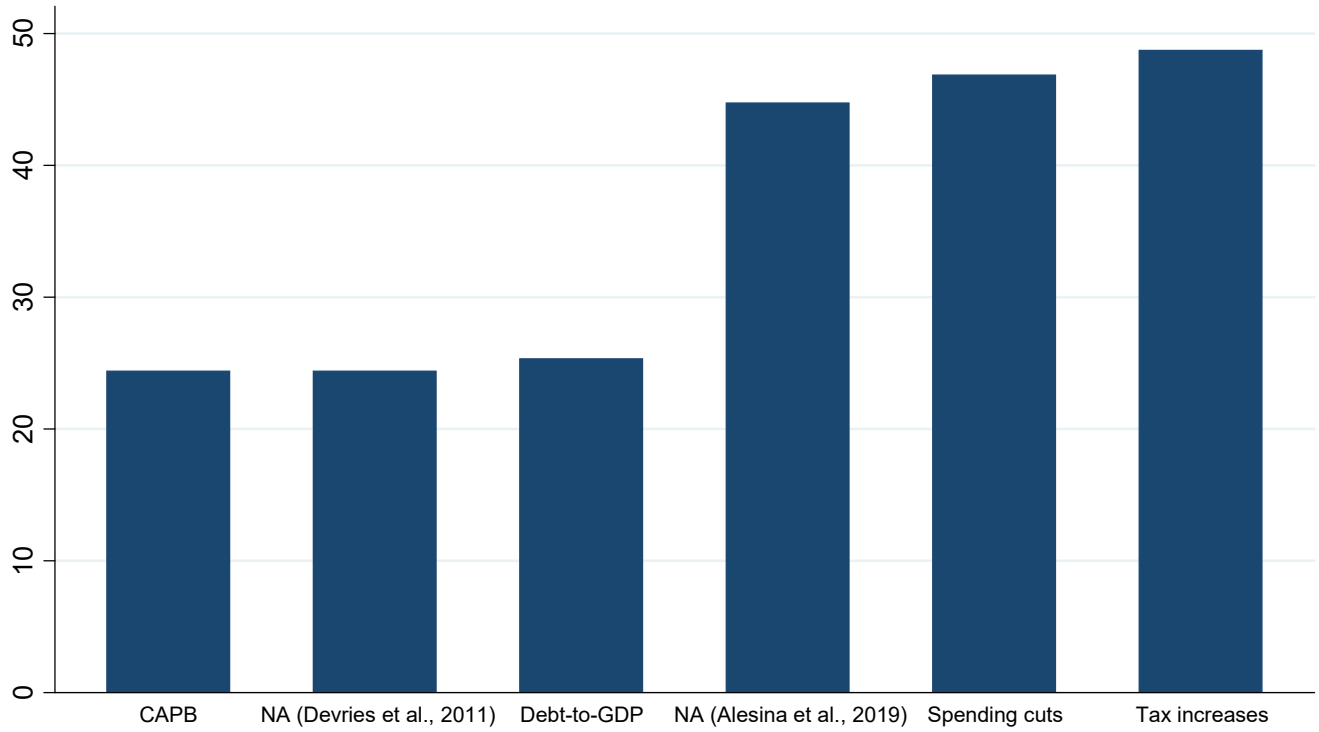
Notes: Numbers are collected using the RePEc database. RePEc comprises 3,122 scientific journals and 4,893 working paper series. In December 2018, RePEc includes more than 460,000 discussion papers, 720,000 journal articles and 30,000 books and chapters. The figure counts each paper that uses the terms "Austerity" (left) and "Fiscal Consolidation" (middle) in the title, abstract, or keywords (blue bars). The red bar labeled "Overlap" shows how often both terms overlap (right). Overlapping means that an article that uses "Austerity" in the title is published in a journal which has also published any article that uses "Fiscal Consolidation" in the title (status as of December 2018).

Figure 7: Comparison of Classification Outcomes across Austerity Indicators



Notes: The figure compares the classification outcome of different austerity measures, including (1) the debt-to-GDP ratio (World Bank, 2019), (2) changes in tax revenues (World Bank, 2019), (3) changes in government spending (World Bank, 2019), (4) CAPB (Alesina and Ardagna, 2010), (5) NA (Devries et al., 2011), and (6) NA (Alesina et al., 2019). The first bar (left) shows the common number of observations, for which each indicator provides data ($N = 398$). Note that this number slightly deviates from the common sample reported in Panel B of Table 5 ($N = 412$), as the analysis of Figure 6 requires using changes in taxes and spending. The second bar shows the number of country-year observations which *at least one* measure classifies as austerity. The third bar shows the number of country-year observations which *each* measure classifies as austerity, and the last bar (right) shows the number of country-year observations which *no* measure classifies as austerity.

Figure 8: Austerity and Violations of Maastricht Criteria (% of Maastricht Violations, where Measures indicate Austerity)



Notes: The figure considers country-year observations with violations of the Maastricht criteria, and shows how many of these country-years (in %) are classified as austerity. The measures include (1) the debt-to-GDP ratio (World Bank, 2019), (2) changes in tax revenues (World Bank, 2019), (3) changes in government spending (World Bank, 2019), (4) CAPB (Alesina and Ardagna, 2010), (5) NA (Devries et al., 2011), and (6) NA (Alesina et al., 2019). The number of underlying country-years differs across indicators, as the intersection between the Maastricht variable and the corresponding austerity measure varies between austerity indicators.

Appendix

Table A1: Journal Articles Published in Top-200 Journals with the Term "Austerity" in the Title.

Author	Year	Title	Journal	#
Alesina, A., O. Barbiero, C. Favero, F. Giavazzi & M. Paradisi	2015	Austerity in 2009 - 2013	*Economic Policy*	9
Guajardo, J., D. Leigh & A. Pescatori	2014	Expansionary Austerity? International Evidence	*Journal of the European Economic Association*	15
Jordà, O. & A. M. Taylor	2016	The Time for Austerity: Estimating the Average Treatment Effect of Fiscal Policy	*Economic Journal*	21
Ball, S. & A. Feltenstein	2001	Bank failures and fiscal austerity: policy prescriptions for a developing country	*Journal of Public Economics*	33
Breuillé, M.-L. & R. J. Gary-Bobo	2007	Sharing budgetary austerity under free mobility and asymmetric information: An optimal regulation approach to fiscal federalism	*Journal of Public Economics*	33
Pappadà, F. & Y. Zylberberg	2017	Austerity and tax compliance	*European Economic Review*	43
Çufadar, A. & F. Özatay	2017	Sovereign risk, public debt, dollarization, and the output effects of fiscal austerity	*Journal of International Money and Finance*	47
Newhouse, J. P.	1982	Austerity in public medical care programs: Miserliness or economic response?	*Journal of Health Economics*	57
Honohan, P.	2016	Debt and austerity: Post-crisis lessons from Ireland	*Journal of Financial Stability*	58
Hu, R. & Zarazaga, C. E.	2017	Fiscal stabilization and the credibility of the U.S. budget sequestration spending austerity	*Journal of Economic Dynamics and Control*	67
Benhabib, J., G. W. Evans & S. Honkapohja	2014	Liquidity traps and expectation dynamics: Fiscal stimulus or fiscal austerity?	*Journal of Economic Dynamics and Control*	67
Klein, M. & R. Winkler	2018	Austerity, inequality, and private debt overhang	*European Journal of Political Economy*	69
Schaltegger, C. A. & M. Weder	2014	Austerity, inequality and politics	*European Journal of Political Economy*	69
Tobin, D.	2011	Austerity and Moral Compromise: Lessons from the Development of China's Banking System	*World Development*	82
McManus, R.	2015	Austerity versus stimulus: the polarizing effect of fiscal policy	*Oxford Economic Papers*	83
Müller, G. J.	2013	Fiscal Austerity and the Multiplier in Times of Crisis	*German Economic Review*	94
Savage, M., T. Callan, B. Nolan & B. Colgan	2018	The Great Recession, Austerity and Inequality: Lessons from Ireland	*Review of Income and Wealth*	100
Kaplanoglou, G. & V. T. Rapanos	2018	Evolutions in consumption Inequality and Poverty in Greece: The Impact of the Crisis and Austerity Policies	*Review of Income and Wealth*	100
Rickman, D. S. & H. Wang	2018	Two tales of two U.S. states: Regional fiscal austerity and economic performance	*Regional Science and Urban Economics*	102
Müller, G. J.	2014	The Debate over Austerity	*International Finance*	110

Bista, R. J. Ederington, J. Minier &	2016	Austerity and Exports	*Review of International*	118
Sinn, H.-W.	2014	Austerity, Growth and Inflation: Remarks on the Eurozone's Unresolved Competitiveness Problem	*The World Economy*	124
Arellano, C. & Y. Bai	2017	Fiscal austerity during debt crises	*Economic Theory*	128
Callinicos, A.	2012	Contradictions of austerity	*Cambridge Journal of*	142
Crotty, J.	2012	The great austerity war: what caused the US deficit and who should pay to fix it?	*Cambridge Journal of Economics*	142
Kinsella, S.	2012	Is Ireland really the role model for austerity?	*Cambridge Journal of Economics*	142
Boyer, R.	2012	The four fallacies of contemporary austerity policies: the lost Keynesian legacy	*Cambridge Journal of Economics*	142
Konzelmann, S. J.	2014	The political economics of austerity	*Cambridge Journal of Economics*	142
Uxó, J. & I. Álvarez	2017	Is the end of fiscal austerity feasible in Spain? An alternative plan to the current Stability Programme (2015-2018)	*Cambridge Journal of Economics*	142
Chen, J. & J. Galbraith	2012	Austerity and fraud under different structures of technology and resource abundance	*Cambridge Journal of Economics*	142
Kuehn, D.	2012	A note on America's 1920-21 depression as an argument for austerity	*Cambridge Journal of Economics*	142
Grimshaw, D. & J. Rubery	2012	The end of the UK's liberal collectivist social model? The implications of the coalition government's policy during the	*Cambridge Journal of Economics*	142
Popov, V.	2012	Russia: austerity and deficit reduction in historical and comparative perspective	*Cambridge Journal of Economics*	142
Mattei, C. E.	2018	Treasury view and post-WWI British austerity: Basil Blackett, Otto Niemeyer and Ralph Hawtrey	*Cambridge Journal of Economics*	142
Botetzagias, I., M. Tsagkar & C. Malesios	2018	Is the 'Troika' Bad for the Environment? An Analysis of EU Countries' Environmental Performance in Times of Economic	*Ecological Economics*	150
Korpi, W. & J. Palme	2003	New Politics and Class Politics in the Context of Austerity and Globalization: Welfare State Regress in 18 Countries, 1975–95	*American Political Science Review*	154
Glomm, G., J. Jung & C. Tran	2018	Fiscal Austerity Measures: Spending Cuts vs. Tax Increases	*Macroeconomic Dynamics*	160
Marchal, S., I. Marx & N. Van Mechelen	2016	Minimum income protection in the austerity tide	*IZA Journal of European Labor Studies*	161
Nikolic, J., I. Rubil & I. Tomić	2017	Pre-crisis reforms, austerity measures and the public-private wage gap in two emerging economies	*Economic Systems*	168
Haley, J. A	2015	Debt and Macroeconomic Behavior: Austerity and Restructuring in an Age of Uncertainty	*Journal of Globalization and Development*	170
Cherif, R. & F. Hasanov	2018	Public debt dynamics: the effects of austerity, inflation, and growth shocks	*Empirical Economics*	174
Hugh-Jones, D.	2014	Why do crises go to waste? Fiscal austerity and public service reform	*Public Choice*	176

Crafts, N. & T. C. Mills	2015	Self-defeating austerity? Evidence from 1930s' Britain	*European Review of Economic History*	181
Oropesa, R. S. & N. S. Landale	2000	From austerity to prosperity? Migration and child poverty among mainland and island Puerto Ricans	*Demography*	192
Soares Martins Neto, A. & G. Porcile	2017	Destabilizing austerity: Fiscal policy in a BOP-dominated macrodynamics	*Structural Change and Economic Dynamics*	196

Notes: The table lists all articles that were published in the Top-200 journals (status as of November 2018) that use the term "austerity" in the title. Articles are sorted by journal rank, which is reported in the column labeled "#". The ranking of the journals refers to IDEAS/RePEc in November 2018.

Table A2: Descriptive Statistics and Data Sources.

	(1) *N*	(2) **Mean**	(3) **Std. Dev.**	(4) **Min**	(5) **Max**	(6) **Data Source**
Log(GDPpc)	8293	8.73	1.24	5.09	12.38	PWT 9.0 (Feenstra et al., 2015)
NA (Devries et al., 2011)	544	0.00	0.01	-0.01	0.05	Devries et al. (2011), Jordà and Taylor (2016), Guajardo et al. (2016)
Change in CAPB	541	-0.00	0.02	-0.08	0.07	Jordà and Taylor (2016)
NA (Alesina et al., 2019), unexp., taxes	592	0.13	0.40	-0.49	3.25	Alesina et al. (2019)
NA (Alesina et al., 2019), unexp., spending	592	0.15	0.40	-0.36	2.92	Alesina et al. (2019)
Tax revenue (% GDP)	3509	17.02	7.58	0.09	65.42	World Bank (2019)
Government spending	6648	15.25	5.94	0.00	76.22	World Bank (2019)
Government debt (% GDP)	1209	57.92	83.42	1.89	2007.9	World Bank (2019)
CAPB treatment	541	0.49	0.50	0.00	1.00	Own calculation
NA treatment (Devries et al., 2011)	544	0.30	0.46	0.00	1.00	Own calculation
Debt treatment	805	0.30	0.46	0.00	1.00	Own calculation
Tax treatment	3509	0.56	0.50	0.00	1.00	Own calculation
Spending treatment	6648	0.47	0.50	0.00	1.00	Own calculation
NA treatment (Alesina et al., 2019)	592	0.26	0.44	0.00	1.00	Own calculation
N	8351					

Table A3: Regression Results---The Effect of Austerity Measures on Economic Growth, Lagged Levels and Differences.

	1st GENERATION: SIMPLE MEASURES			2nd GENERATION: CAPB AND NARRATIVE APPROACH			
	(1) Debt (Reduction)	(2) Tax (Revenue)	(3) Gov. Spend. (Reduction)	(4) CAPB (Alesina & Ardagna)	(5) Narrative Ap. (Devries et. al)	(6) Narrative: Tax (Alesina et al.)	(7) Narrative: Spend (Alesina et al.)
	Panel A: Lagged Levels of Austerity Measures						
Austerity $(t-1)$	0.005***	-0.001	0.001**	0.014	-0.185	-0.005**	-0.002
	(0.002)	(0.000)	(0.000)	(0.048)	(0.108)	(0.002)	(0.002)
Log(GDP^{pc}) $(t-1)$	1.267***	1.287***	1.262***	1.413***	1.402***	1.394***	1.409***
	(0.077)	(0.040)	(0.040)	(0.080)	(0.097)	(0.075)	(0.080)
Log(GDP^{pc}) $(t-2)$	-0.326***	-0.347***	-0.280***	-0.471***	-0.470***	-0.455***	-0.472***
	(0.105)	(0.051)	(0.057)	(0.109)	(0.107)	(0.108)	(0.108)
Log(GDP^{pc}) $(t-3)$	0.012	0.080**	0.035	0.097	0.095	0.088	0.090
	(0.051)	(0.038)	(0.029)	(0.078)	(0.074)	(0.062)	(0.064)
Log(GDP^{pc}) $(t-4)$	-0.011	-0.046	-0.036	-0.081	-0.071	-0.059	-0.059
	(0.024)	(0.029)	(0.025)	(0.057)	(0.056)	(0.041)	(0.044)
Observations	839	1,090	1,386	541	544	576	576
Countries	34	30	30	17	17	16	16
R-Squared	0.99	0.99	0.99	0.99	0.99	0.99	0.99
F Stat	39935	52795	21930	20849	29160	46811	29404
F p-val	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Country-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Period-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Panel B: Estimation in Differences						
Δ Austerity	0.006	-0.001	0.012***	0.062**	-0.135	-0.000	-0.001
	(0.005)	(0.001)	(0.002)	(0.026)	(0.098)	(0.001)	(0.001)
Observations	803	1,084	1,359	523	527	576	576
Countries	30	30	30	17	17	16	16
R-Squared	0.47	0.45	0.50	0.64	0.64	0.62	0.62
F Stat	24.64	16.20	30.10	29.47	46.76	18.01	13.73
F p-val	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Country-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Period-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The table reports regression results on the effect of austerity on long-run economic growth, with Huber/White robust standard errors in parentheses. All regressions include country-fixed effects and period-fixed effects. The austerity measures are as follows: Column (1): Debt Reduction (World Bank, 2019), Column (2): Tax Revenues (World Bank, 2019), Column (3): Reduction in Government Spending (World Bank, 2019), Column (4): Changes in CAPB as measured by Alesina and Ardagna (2010), Column (5): Narrative Approach effect size as reported by Devries et al. (2011) and Gujardo et al. (2014), Column (6): Narrative Approach total impact of taxes (unexpected) as reported by Alesina et al., 2019, Column (7): Narrative Approach total impact of spending (unexpected) as reported by Alesina et al. (2019). * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$